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SYSTEM AND METHOD FOR LOCAL VIDEO DISTRIBUTION

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Field of the Invention

[0001] The present disclosure relates generally to video content communication, and more specifically to a system and method for local video distribution.

Background

[0002] Video distribution services like cable television services and direct broadcast satellite (DBS) television services send a signal representing several different channels to the premises of their customers. In many cases, this incoming signal is digital and represents literally hundreds of different channels. With so many channels, a consumer may need to employ a device to "tune in" a given channel. This may be especially true when some of the channels represent so-called premium channels.

[0003] The "tuning-in" process typically involves parsing the incoming signal to identify the portions that represent the desired channel and then decoding those portions. Devices that perform the parsing and decoding processes may include, among others, a personal computer executing some video application or a set-top box (STB). Conventionally, an STB or other tuning device is necessary for television viewers or customers who wish to use an analog television set to receive digital broadcasts.

[0004] In many cases, a video distribution service provider will make an STB and a remote control for that STB available to the customer. The typical STB will actually rest on top of the television it supports. If a customer wants to receive the video distribution service in more than one room of the house or on more than one television, the customer will likely need to purchase or secure additional STBs. As the number of televisions to be used increases, the cost associated with receiving the service may become too high. The amount of space taken up by multiple STBs may become too large, and the number of additional remote controls within the home may become too confusing.

Brief Description of the Drawings

[0005] It will be appreciated that for simplicity and clarity of illustration, elements illustrated in the Figures have not necessarily been drawn to scale. For example, the dimensions of some of the elements are exaggerated relative to other elements. Embodiments incorporating teachings of the present disclosure are shown and described with respect to the drawings presented herein, in which:

[0006] FIG.1 presents a block diagram of a video distribution system that incorporates teachings of the present disclosure;

[0007] FIG. 2 shows a flow diagram for a technique that may be used to implement teachings of the present disclosure;

[0008] FIG. 3 presents a simplified block diagram for a video distribution system that incorporates teachings of the present disclosure; and

[0009] FIG. 4 shows a flow diagram for a technique that may be used to implement teachings of the present disclosure.

DETAILED DESCRIPTION OF THE DRAWINGS

[0010] As mentioned above, FIG.1 presents a block diagram of a video distribution system 10 that incorporates teachings of the present disclosure. As depicted, system 10 includes an integrated tuning device 12, which may be an STB, a personal computer executing a video application, or some other electronic device capable of performing STB-like functions. As depicted, device 12 includes a network interface adapter 14 providing at least a portion of a communication path interconnecting device 12 to a wide area communication network, which may include a cable network, a direct broadcast satellite (DBS) system, a telecommunication network, and/or some other network capable of communicating information to device 12.

[0011] In operation, adapter 14 may receive a multiplexed signal representing several different video information streams. For example, a cable service provider may send a signal to each customer that represents hundreds of broadcast video channels and several more broadcast audio channels. Satellite television providers, like DBS providers, may provide even more channels. Many of the distributed video channels may be "premium" channels, and a service provider may charge additional monies for viewing a program on one of these premium channels.

[0012] In some embodiments of device 12, adapter 14 may perform front-end subsystem functions like signal reception, demodulation, error correction, signal encoding, and/or other signal manipulations. Many of these subsystem functions may be provider specific. For example, a signal coming from a cable head end may require front end processing that is substantially different than the processing performed on a DBS signal.

[0013] Adapter 14 may output a processed signal to diplexer 16. As depicted, device 12 may be capable of performing several high-end functions. For example, in addition to performing some STB-like functions, device 12 may also effectively function as a multimedia desktop computer that runs a variety of advanced services such as videoconferencing, home networking, Internet Protocol telephony, Video on Demand (VoD), high-speed Internet Television, personal video recording, and/or others. Diplexer

16 may facilitate some of these services by distinguish between upstream and downstream communication flow. In some embodiments, upstream traffic may be carried in a defined frequency range that is different than the defined frequency range of downstream traffic. As such, diplexer 16 may be able to separate upstream from downstream traffic by reference to the frequency of the signals.

[0014] Diplexer 16 may output a downstream multiplexed signal to a splitter 18, which may be passive in operation. In some embodiments, splitter 18 may passively split a signal into intermediate signals, which may be identical or nearly identical to each other. As shown, splitter 18 may create three split streams 20 and one downstream data stream 21. Split streams 20 may feed three separate output modules 22, 24, and 26. As shown, an output module, like module 22, may include a decoder 28 and a modulator 30. Because splitting a signal may degrade the noise figure (NF) of a system, a low noise, high linearity amplifier 32 may be added to device 12 upstream of splitter 18. In some embodiments, amplifier 32 may be low noise and high linearity so as not to compromise what is downstream in the signal chain.

[0015] As shown, splitter 18 may also pass a data stream 21 to a modem 34, which may be integral to or separate from device 12. Modem 34 may be a cable modem supporting a DOCSIS standard, a dial-up modem, a wireless modem, a satellite modem, and/or an xDSL modem. In some embodiments, a tuner 36 may alter stream 21 and output a signal in a form or modulation schema acceptable to modem 34. On the upstream side, an outgoing signal 38 may pass through amplifier 40 and into diplexer 16 for delivery to a broader network, like the Public Internet.

[0016] In some embodiments, module 22 and/or components of module 22 may be remote controllable. In practice, a remote control device may communicate a request signal to decoder 28 requesting decoder 28 to find and decode a specific video information stream included in the multiplexed signal. The remote control device may communicate the request via a radio frequency (RF) signal, an infrared signal, and/or via some other mechanism. In an embodiment using RF signaling, the remote control may communicate with decoder 28 via wireless local area network (WLAN) module 42.

[0017] In some embodiments, module 42 may operate as a WLAN hub and may support communication via a 900 MHz communication signal similar to those employed by cordless telephones, an 802.11(x) communication protocol, a Bluetooth communication protocol, or some other WLAN communication technique. When operating as a WLAN hub, module 42 may effectively allow device 12 to act as a wireless home networking hub. As such, other electronic devices in the home, like computer 44 and televisions 46, 48, and 50 may be able to enjoy Internet access via device 12 and wireless link 52.

[0018] Device 12 may also include a combiner 54, which may output a composite signal 56 for communication via a premise network 58. Composite signal 56 may include various video information streams modulated onto selected radio frequency (RF) bands. For example, output from module 22 may be modulated on a carrier frequency having an assigned frequency range of approximately 60 to 66 MHz. Output from module 24 may be modulated on a carrier frequency having an assigned frequency range of approximately 66 to 72 MHz, and output from module 26 may be modulated on a carrier frequency having an assigned frequency range of approximately 76 to 82 MHz. The assigned frequency ranges may correspond to the 6 MHz slices of the Very High Frequency (VHF) spectrum and the Ultra-High Frequency (UHF) spectrum assigned by the Federal Communications Commission (FCC) to television channels.

[0019] The FCC established television channels 2 to 6 using 6MHz blocks of VHF frequencies between 54 and 88 MHz. Channels 7 to 13 use 6MHz blocks of VHF between 174 and 216 MHz, and channels 14 to 69 use 6MHz blocks of UHF frequencies between 470 MHz and 812 MHz. In many applications, cable service providers use the frequencies between 88 MHz and 174 MHz for 13 channels of programming and begin channel 14 at 216 MHz. On cable-ready televisions, a user may toggle between CATV reception and Antenna reception. This toggling tells the television's tuner whether to tune around the restricted blocks in the FCC broadcast plan or to tune "straight through". In the CATV position, the tuner may start at 88 MHz.

[0020] As mentioned above, combiner 54 may output signal 56 with information streams representing broadcast channel programs modulated on carrier frequencies more

commonly associated with Antenna reception. In effect, a cable service provider's broadcast channel 54, which may carry ESPN programming, may be modulated on a carrier frequency assigned to channel 7 by the FCC. As such, a user may be able to tune into the ESPN programming with a non-cable ready television by tuning the television to channel 7.

[0021] As depicted, device 12 may also include a local memory 60, which may store, among other things, recorded programming and a map linking a plurality of users or family members with associated carrier frequencies. The associated frequencies may be given approximately 6 MHz slices of the radio frequency spectrum that are more commonly associated with Antenna reception. A specific user may input a command identifying a desired video stream like ESPN programming. In some cases, the programming may be encoded in a Moving Pictures Expert Group (MPEG) format. As such, the desired video stream may need to be decoded by decoder 28 before being modulated on the carrier frequency associated with the specific user. The modulated signal may be output to premise network 58, and the user may be able to access the ESPN program by tuning any premise network connected television like televisions 46, 48, and 50 to the appropriate carrier frequency. In some embodiments, a given modulator, like modulator 30, may be fixed to output incoming signals on a predefined carrier frequency.

[0022] In effect, when a given user "changes the channel", the user causes device 12 to place a different program on the carrier frequency assigned to that user. If, for example, a family of five lives in a home with a coaxial cable-based premise network, the family may connect five different televisions to various cable outlets throughout the home. Each of the televisions may be set to Antenna reception, and the family may assign channel 7 to Dad, channel 8 to Mom, channel 9 to Child1, channel 10 to Child2, and channel 11 to Child3. If Dad "changes the channel", device 12 may recognize that Dad wants to watch a different show and may modulate a video stream representing that show on channel 7's frequency. As such, Dad may move to any of the five televisions and tune the television to channel 7 to watch his show.

[0023] In an embodiment where device 12 "knows" which family member is assigned to a given channel, device 12 may perform additional tasks. For example, device 12 may present messaging information addressed to a given user on that user's channel. In operation, messaging engine 62 may initiate communication of message information via premise network 58. Message information may represent a message sent using several different services such as electronic mail, mobile alerts, Instant Messaging, Short Messaging Service, Enhanced Messaging Service, and Multi-media Messaging Service.

[0024] Device 12 may also include enhanced parental control and metric tracking features. A metric engine 64 may track a metric associated with a specific user and/or a given information stream. The metric may include, for example, a video stream content rating, an amount of time associated with outputting the information stream, a cost associated with viewing the information stream, and/or an assigned programming channel for the first video information stream.

[0025] In the family of five referenced above, Mom may not want Child2 to watch shows having a "Teen" or above rating. Metric engine 64 may recognize that Child2 (or someone acting as Child2) is attempting to have a "Mature" program modulated onto channel 10 – the channel assigned to Child2. Metric engine 64 may block the attempt and cause channel 10 to blue screen. Similarly, Dad may want to limit Child3 to two hours of television a week. Metric engine 64 may track "on time" for channel 11 – the channel assigned to Child3. In another example, Mom and Dad may allow Child1 to watch pay-per-view sports, but may want to limit the total expenditure to twenty dollars a week. As such, metric engine 64 may allow specific sports-related premium channels to be modulated onto channel 9, but only until the cost for such pay-per-view streams reaches twenty dollars.

[0026] With such advanced programmable features, device 12 may also include a Web interface engine 66. Engine 66 may allow remote web-based administration of device 12. Device 12 may also include local administration features. As shown, graphical user interface (GUI) engine 68 may be capable of initiating presentation of a GUI on a

television display communicatively coupled to premise network 58. The GUI may also be presented in connection with a Web browser and a Web browsing session of a user.

[0027] An administrator, which may be Mom in the above-referenced family, may be presented with an administration screen. The screen may allow for simplified configuration of the features associated with device 12. Additionally, the admin screen may allow Mom to configure or administer a home network that includes device 12.

[0028] As mentioned above, FIG. 2 shows a flow diagram for a technique 70 that may be used to implement teachings of the present disclosure. Technique 70 may begin at step 72 when a signal representing a plurality of programming and/or other information is received from a broader network. In some embodiments, the received signal may require some front-end operations, which may occur at step 74. These operations may include signal reception, demodulation, error correction, signal encoding, and/or other signal manipulations. The type and amount of necessary front-end operations may depend on the source of the received signal.

[0029] At step 76, a pre-processed signal may be passed along directly or indirectly to a splitter. The splitter may, at step 78, passively split the incoming signal into a plurality of similar intermediate signals. The plurality of signals may leave the splitter and move to a decoding element. The decoding element may be able to parse through a given intermediate signal to find a desired information stream included in the signal. The parsing function may occur at step 80.

[0030] At step 82, the decoding element may decode the desired information stream. The stream may have been encoded using an MPEG standard, like MPEG2. Once decoded, a modulator may "place" the decoded stream on a carrier frequency. The modulation may occur at step 84. In embodiments like the one depicted in system 10 of Fig. 1, there may be multiple decoder/modulator pairs. Each of the multiple modulators may have unique assigned carrier frequencies. As such, the output signals of the multiple modulators may be combined without fear of excessive interference. The signal combination may occur at step 86, after which the combined signal may be output to a premise network at step 88.

[0031] As depicted in technique 70, information associated with a GUI element may be updated at step 90. In a given embodiment, a system incorporating teachings of the present disclosure may be capable of presenting a GUI element that indicates the programming being distributed to the premise network. For example, an individual may want to know what show is currently being modulated on television channels 7, 8, 9, 10, and 11. To access this information, the individual may request display of the GUI element. By updating GUI element information at step 90, technique 70 helps ensure that the GUI element contains accurate information.

[0032] As depicted, technique 70 progress to stop at step 92 after updating the GUI element information. As mentioned above, FIG. 3 presents a simplified block diagram for a video distribution system 94 that incorporates teachings of the present disclosure. System 94 may include an STB-capable device 96 that has several remote controllable modules 98, 100, and 102. As depicted, modules 98, 100, and 102 may be configured to output a signal modulated to an assigned frequency block. In operation, a signal may arrive at device 96 directly or indirectly from a video service provider. For example, a DBS signal may be captured by a local satellite dish and fed to device 96 or a cable signal may arrive from a cable head-end and be fed to device 96.

[0033] The arriving signal may contain a collection of information streams representing various broadcast programs. The signal may enter device 96 via interface 104. The signal or some embodiment of the signal may then be passed to modules 98, 100, and 102. These modules may be capable of finding information, within the collection, that represents a specific broadcast program. The modules may then decode this found information to create a decoded version of what may have been a selected MPEG encoded video stream.

[0034] Modules 98, 100, and 102 may be configured to output their respective found signals to interface 106, which may transfer the signals to a premise network element 108. The premise network element may include a piece of coaxial cable, a wireless local area network node, or some other element capable of communicating information.

[0035] In operation, modules 98, 100, and 102 may have assigned frequency blocks defining a carrier frequency on which the modules should output their respective signals. In some embodiments, these frequency blocks may correspond to portions of the Very High Frequency and Ultra-High Frequency portions of the RF spectrum. In some embodiments of system 94, a module like module 98 may be addressable and may "listen" for remote control commands directing its operation.

[0036] As such, system 94 may include a remote control 110 capable of outputting individual commands to each of the modules. Remote control 110 may come in several different embodiments. In one embodiment, remote control 110 may be a wireless telephone that has Bluetooth functionality such as a class 3 type communication circuitry. In preferred embodiments, remote control 110 may communicate with module 98 wirelessly using an RF signal 112.

[0037] In some embodiments, remote control 110 may have an access engine 114. Access engine 114 may be able to authenticate the user of remote control 110. For example, a user may want to tell module 98 to put a different broadcast channel on the carrier frequency assigned to module 98. With reference to the family of five descriptions above, Dad may want to change from ESPN to CNN. Remote control 110 may want to ensure that the user seeking to change Dad's channel actually is Dad. As such, access engine 114 may prompt Dad to enter a username and password combination. Access engine 114 may employ credential schemas other than or in addition to simple username/password combinations. These schemas could be, for example, device-based and/or biometric based.

[0038] In response to authentication by access engine 114, remote control 110 may allow Dad to signal module 98 to output a different program on channel 7, which may mean module 98 will now modulate CNN to a carrier frequency having an approximate range of 174 to 180 MHz. As such, Dad may be able to tune television 116, which may be a premise network connected television, to channel 7 and access CNN programming.

[0039] As depicted in system 94, television 116 may be connected to the premise network via wall plate 118. In preferred embodiments, Dad could take television 116 or

another display-capable device and connect to the premise network via wall plate 120. Again, if Dad tunes the display device to channel 7, Dad can enjoy CNN programming.

[0040] As mentioned above in the Brief Description of the Drawings, FIG. 4 shows a flow diagram for a technique 122 that may be used to implement teachings of the present disclosure. At step 124, a system like system 10 of Fig. 1 may allow an administrator to link users to a given premise network channel. At step 126, one of the users may indicate a desire to alter the programming available on their assigned channel, and that user may be prompted to input credentials. The credentials may be authenticated at step 128, and the system may receive an authorized input selecting a different video stream at step 130.

[0041] In an embodiment that allows broadcast channel blocking or some other form of viewing control, a system executing technique 122 may compare the requested channel against a block list to determine if the user is allowed to receive the selected channel. This analysis may be performed at step 132. If the user is not allowed to view the requested program or information, the user may be notified, presented with a blue screen, and technique 122 may progress to stop at step 144.

[0042] If the user is allowed to view the requested program or information, technique 122 may progress to step 134, and the appropriate stream may be identified. The stream may be decoded at step 136 and modulated on to an appropriate carrier frequency at step 138. The modulated stream may be output to a premise network at step 140 and, in systems that include metric tracking functionality; metric tracking may begin at step 142. Technique 122 may then progress to stop at step 144.

[0043] In various embodiments, the remote control may take forms including wireless and cordless phones, personal digital assistants with built in communications circuitries, universal remotes, wireless telephones, cellular telephones, mobile telephones, and other wireless devices.

[0044] The methods and systems described herein provide for an adaptable implementation. Although certain embodiments have been described using specific examples, it will be apparent to those skilled in the art that the invention is not limited to

these few examples. Additionally, various types of wireless transceivers, transmitters, receivers, and protocols are currently available which could be suitable for use in employing the methods as taught herein. Note also, that although certain illustrative embodiments have been shown and described in detail herein, along with certain variants thereof, many other varied embodiments may be constructed by those skilled in the art.

[0045] The benefits, advantages, solutions to problems, and any element(s) that may cause any benefit, advantage, or solution to occur or become more pronounced are not to be construed as a critical, required, or essential feature or element of the present invention. Accordingly, the present invention is not intended to be limited to the specific form set forth herein, but on the contrary, it is intended to cover such alternatives, modifications, and equivalents, as can be reasonably included within the spirit and scope of the invention as provided by the claims below.